

WHAT IS CLAIMED IS:

1. A multiple print engine for printing a multi-page job with multiple copies, comprising:

a plurality of physical print engines, each having an input for receiving a rasterized data image and an output bin for outputting copies of the rasterized image;

a RIP engine for receiving a multi-page input job for rasterizing thereof into individual pages as a plurality of rasterized images;

a storage medium for storing said rasterized images of the pages;

a virtual stack device for defining at least two virtual printers, each having associated therewith a plurality of said physical print engines, but less than all, said physical print engines associated with each of said virtual printers grouped according to different characteristics of said physical print engines, said virtual stack device operable to process a job stored in said storage medium and virtually organizing pages in said received job in a stack corresponding to the manner in which they can be retrieved from the physical print engine by user in an order and number defined by the user;

a job router for defining the one of said virtual printers when a multiple-copy job is routed to a select one of said virtual printers in accordance with the characteristics of said virtual printer and said multi-page, multiple-copy job;

a job stacking device for segmenting each of said virtual stacks into discrete job stacks, each of said discrete job stacks associated with one of said physical print engines in the associated virtual printer; and

a print control device for printing each of said job stacks in the associated one of said physical print engines.

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PROPOSED CLAIMS (15-37)

METHOD AND APPARATUS FOR DISTRIBUTING PAGES TO
INDIVIDUAL PRINT ENGINES IN A MULTIPLE PRINT ENGINE

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15. A multiple print engine for printing one or more copies of a multiple page document input as a single print job, comprising:

a plurality of physical print engines, each having an input for rasterized data and an output bin for receiving printed output pages;

5 a job distributor having a single RIP engine for receiving said multiple page documents and providing said rasterized page data organized for parallel distribution to said inputs of selected ones of said plurality of physical print engines according to print job parameters associated with said rasterized data.

16. The apparatus to Claim 15, wherein each said physical print engine comprises an electrophotographic print engine having an interface circuit coupled to said input for receiving said rasterized data from said job distributor.

17. The apparatus of Claim 15, wherein said ~~processor~~ ^{job distributor} comprises:
a RIP engine for receiving said multiple page document and rasterizing it into rasterized images, each said rasterized image comprising a page of said single print;

5 a storage device for storing each said rasterized image;
an image task manager for retrieving the rasterized image for said print job from said storage device and determining a print order for each said page of said print job according to said print job parameters; and

10 an engine manager for selecting a one physical print engine to print each retrieved rasterized image according to said print order and distributing said image to said select one of said physical print engines according to said print order.

18. The apparatus of Claim 17, wherein said RIP engine comprises:
20 a decoder for decoding received input print strings;
a rasterized ~~f~~ for generating a rasterized image mapped according to said

decoded input print strings; and

a formatter for constituting each said image as a page of data.

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19. The apparatus of Claim 17, wherein said storage device comprises a plurality of page buffers for storing successively rasterized page data images.

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20. The apparatus of Claim 17, wherein said image task manager comprises:

a dissembler for extracting ^{said print job} document parameters from said rasterized page data and reading ^{entered by} printing parameters from said information received from said user; and

an arranger for arranging ^{said} a print order for each print job based on said ^{print job} document parameters and said ^{information entered by said user} printing parameters.

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21. The apparatus of Claim 17, wherein said print job parameters associated with said rasterized images comprises information encoded in said rasterized ^{page data} images and information ^{entered by} received from a user.

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22. The apparatus of Claim 21, wherein said encoded information includes data selected from the list comprising the number of document copies, the number of pages in each document, printing color and printing resolution, speed and bit depth.

23. The multiple print engine of Claim 15, wherein said image task manager is operable to allow rasterized images to be directly routed to said engine manager as they are output by said processor.

24. The multiple print engine of Claim 21, comprising a write-through mode wherein a portion of said rasterized images is temporarily stored in said storage device when throughput through said ^{RP} engine manager is greater than the throughput through said ~~RP~~ engine. ^{Manager}

25. The multiple print engine of Claim ¹⁷~~15~~, wherein said engine manager comprises:

a selector responsive to said print order for associating one of said plurality of physical print engines with each said rasterized image; and

5 a distributor for coupling said selected physical print engine to said storage device and transferring said image to said selected physical print engine.

26. The multiple print engine of Claim ¹⁷~~15~~, wherein each of said rasterized images has associated therewith print characteristics for the print job, such that said engine manager is operable to control said selected one physical print engine independent of information encoded in said rasterized images that are sent to said selected one physical print engine.

27. The multiple print engine of Claim ¹⁷~~15~~, wherein said engine manager is operable to send rasterized images to at least two physical print engines at the same time.

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28. A multiple print engine for printing a multiple page document input as a single print job, comprising:

a plurality of physical print engines, each having an input for rasterized data and an output bin for receiving printed output pages;

a processor for receiving said multiple page document, rasterizing it into rasterized images and storing said rasterized images, each said rasterized image comprising a page of said single print job;

an image task manager for retrieving the rasterized image for said print job from said processor and determining a print order for each said page of said print job according to information associated with said images; and

an engine manager for selecting a one physical print engine to print each retrieved rasterized image according to said print order and distributing said image to said select one of said physical print engines according to said print order.

29. The apparatus to Claim 28, wherein each said physical print engine comprises an electrophotographic print engine having an interface circuit coupled to said input for receiving said rasterized data from said engine manager.

30. The multiple print engine of Claim 28, wherein said processor comprises:

a decoder for decoding received input print strings;

5 a RIP engine for generating a rasterized imae mapped according to said decoded input print strings;

a formatter for constituting each said image as a page of data; and

a storage device for storing each said rasterized image.

31. The multiple print engine of Claim 30, wherein said storage device comprises a plurality of page buffers for storing successively rasterized page data images.

32. The multiple print engine of Claim 28, wherein said image task manager comprises:

a disassembler for extracting said information associated with said images; and

an arranger for arranging a print order for each print job based on said information associated with said images.

33. The multiple print engine of Claim 30, wherein said image task manager is operable to allow said rasterized images to be directly routed to said engine manager as they are output by said processor.

34. The multiple print engine of Claim 33, comprising a write-through mode wherein a portion of said rasterized images is temporarily stored in said storage device when throughput through said engine manager is greater than the throughput through said RIP engine.

35. The multiple print engine of Claim 28, wherein said engine manager comprises:

a selector responsive to said print order for associating one of said plurality of physical print engines with each said rasterized image; and

a distributor for coupling said selected physical print engine to said storage device and transferring said image to said selected physical print engine.

36. The multiple print engine of Claim 28, wherein said image task manager is operable to allow rasterized images to be directly routed to said engine manager as they are output by said processor.

37. The multiple print engine of Claim 28, wherein said engine manager is operable to send said rasterized image to at least two physical print engines at the same time.